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ImageUltra Builder Case Study

Creating Images for OEM PCs using ImageUltra Builder and the lessons learned during an engagement for Allegis Group

Preface

Integrated Technologies Services (ITS) and the IBM Imaging Technology Center (IITC) worked in concert to respond to a customer's request to create a standard deployable image for both IBM and OEM platforms. The purpose of this document is to discuss the experiences, pitfalls, and insights gained from the engagement. The intended audience for this document is practitioners who anticipate working with the IITC to use ImageUltra Builder to create an image for deployment on OEM PCs.

This document incorporates a number of the lessons learned while automating the installation of Microsoft Windows XP using IBM ImageUltra Builder on PCs manufactured by a third-party vendor. The project required that ITS work with IITC to adapt the IITC scripts for use on the third party's PCs.

Solution approach

Many different scenarios exist to deploy and load the Microsoft OS onto workstations and servers. Several of these scenarios have been designated as unsupported by Microsoft for various reasons (such as replicating the SID to every device duplicated). Portable-SysPrep, a Microsoft-approved method, was the installation method utilized in this specific scenario. The method for image deployment used here was based on loading the initial image onto the PC using an installation CD created using ImageUltra Builder. This image was then reproduced using PowerQuest DeployCenter 5.5 to distribute to multiple desktops simultaneously.

Preparation

The practitioner must be proficient in using the Microsoft SysPrep tool to create silent installations of applications by employing scripting tools, switches, and repackaging applications that might need to be deployed. At a minimum, the practitioner should possess level 4 skills using ImageUltra Builder. We also recommend that practitioners maintain their own tool sets, files, directory structures, drivers, and applications required to complete the imaging process on an OEM PC.

Important: Always ensure that the PC is plugged into a stable power source and that the monitor, mouse, and keyboard are attached.

Network

The IITC supplies the practitioner with a lab station/work area to work on designing and building the image and related processes. It has the ability to support multiple network topologies, including but not limited to Token-Ring, Ethernet, and fiber channel. Each lab station supplies multiple connections to the required topologies. Any necessary patch cables are supplied by the IITC upon request. The attachment to the IBM “dot 9” network allows external Internet access. The IITC’s “dot 150” network provides access to the ImageUltra builder environment.

Note: All foreign media must be virus-scanned prior to use in the IITC.

The “dot 150” environment is administered locally by the IITC. The practitioner must obtain a user ID and password from either the system administrator or via a request through the IITC management team in order to log onto the “dot 150” network. At the time of this writing, two file shares were of immediate importance to the practitioner, the ImageUltra Builder (\IUB) share, and the Images (\IMAGES) repository:

- ▶ Ralcbc06\IUB
- ▶ Ralcbc06\IMAGES

The practitioner must confirm that these shares are still available and map to them on the system being used as an ImageUltra Builder server:

The IUB directory contains ImageUltra Builder tools, applications, source files, etc. The IMAGES directory is the repository for the IITC’s ongoing projects.

Note: Browsing is not allowed at the root of the IMAGES directory.

Change to the directory created by the IITC to support the imaging process ¹ after successfully mapping to the IMAGES directory. Projects in this directory are defined by project numbers (e.g., 19063.1). Create all necessary project-related directories as sub-directories of the project folder. Then create a sub-directory within the repository view of ImageUltra Builder ² to contain the components for the machine type being worked on (e.g., 19063.1\Dell).

¹ Obtain the directory name from the IITC Team Leader responsible for the contract.

² Hereafter referred to simply as the “Builder”

Lessons learned

- ▶ We strongly recommend that practitioners install the latest virus definition files prior to arrival at the IITC. We also suggest that you update your virus definition files and run a full virus scan daily. Two viruses were discovered during this assignment.
- ▶ The practitioner's mobile computer was frequently denied access to the Images directory when network drives were mapped through the Microsoft GUI.³ The automatic reconnect feature of Windows XP causes the user ID to become locked out if the PC experiences problems with network connectivity. We recommend that you either map network drives using the NET USE command, or create a batch file to map the drives. For example, you could create a MapIUB.cmd on the desktop with the following lines:

```
@echo off
net use I: \\ralcbc06.raleigh.ibm.com\IUB /USER:ralcbc\<user_name> <password >
net use J: \\ralcbc06.raleigh.ibm.com\Images\<project_ID>/USER:ralcbc\<user_name>
<password>
```

where <user_name> and <password> are the user ID and password assigned by the system administrator from the IITC, where ralcbc is the domain name for the IITC Builder network, and where <project_ID> is the previously assigned project number.

Note: Be sure to perform a proper shutdown of the Builder environment. Clicking the “Close” icon [X] can cause various maps to hang in the open state, and if the hang state is forced off by an administrator, data can become corrupted.

Repository

The repository for the IITC project is the location for the source files and maps for the deployment. Prior to arriving on site at the IITC, verify through the IITC interface which version of Builder is currently in use. Then download and install the current version. The IITC will insist that the version the practitioner uses is the same as the site version.

In the project repository, create a sub-directory for the OEM deployment, with additional sub-directories for operating systems, patches, drivers, applications, etc. In order to maintain uniformity, the practitioner should follow the IITC's naming conventions when creating Base Maps, Drive Maps, Operating System Modules, Application Modules, etc., appending the manufacturer's prefix or suffix abbreviation.

Base maps

It is assumed that the IITC will have Base Maps that were previously created to deploy an IBM image. The practitioner should use an existing IITC Base Map as a foundation and model for building the OEM image Base Map, and might be required to create several iterations of the Base Map as customer requirements evolve.⁴ Each time a new iteration of the Base Map is created and recreated for the IBM deployment, the practitioner must modify his or her portion of the Base Map. The import process will not port directly to the OEM deployment, and “handles” to accomplish various tasks will require repair. Each iteration of the deployment must be retested, even if the OEM deployment worked prior to the modification of the Base Map and had no content for the OEM deployment.

³ Explorer's My Network Places

⁴ For example, the customer requests additional entries in the Base Map to gather more information at installation time. Each of these must be incorporated into the OEM deployment.

Lessons learned

- ▶ Do not “copy” the IITC Base Map into the OEM Base Map pane. This is a working replica of the IITC map, and any modifications of the content will directly modify all instances of the Base Map. Be sure to select the IITC map in the Builder as a template and create a new OEM Base Map.
- ▶ Closing the Builder prior to closing the repository view can hang the Base Map in a transition state.
- ▶ Remove the IBM-specific content of the Base Map when the deployments operate as required. This will help optimize the OEM deployment.
- ▶ Recreating the Base Map after an IITC modification will cause the SysPrep script and the source code to deploy in the same install slot, resulting in a Windows setup failure. Modify the Base Map properties to install the source code prior to the SysPrep script under operating systems. Then check the remaining stages to ensure that the modules are deploying properly.⁵

Driver maps

The Driver Maps for the OEM deployment will be completely separate from the IITC Driver Maps. IITC support of ITS effort on OEM products is limited (in fact, working on OEM products is outside the IITC charter). In the event you are unsure how to create your User Map, build it using the IITC map as a template and copy the content of the IITC map into a map named for your deployment. Insert a menu item into the existing map to define the OEM device. Assign the required device drivers to the map and delete the references to the original map.

Lessons learned

In network options, do not use the Drive Map filter processing setting, which appeared to cause problems when creating deployment CDs. Entire CDs were skipped in the deployment process. Although it was never confirmed as the root cause of the problem, a developer suggested that this setting not be used.

Operating systems

The base image for the operating system (Windows XP) is created by the IITC, and should be used for both the IBM and OEM platforms. Other patches, shortcuts, schemes, permission changes, service packs, etc. for the OEM platform might be required for a successful deployment. It is the practitioner’s responsibility to create any additional operating systems modules required for a successful deployment. Again, IITC support is limited. Examine an operating system module created by the IITC and use it as a template for subsequent modules. Keep in mind that the installation of operating system modules is a pre-requisite. You should devote special care to the install slot assigned to operating system modules.

⁵ The Install Sequence Tab enables you to define the order in which modules within the same install slot are installed. This is usually unnecessary unless you have installation modules that are colliding, have dependencies upon other modules being installed first, etc.

Applications

A number of the application modules created by the IITC are irrelevant to the OEM deployment.⁶ Be sure to remove these applications from the OEM deployment and any references to these programs in subsequent maps imported from the IITC solution.

Important: The IITC requires that all application installations occur silently. Installation scripts cannot contain timer-related delays that wait for a specific dialog box or window to become active (e.g., "WScript.Sleep 500").

Applications that cannot be installed with a command line switch for a silent installation must be deployed using a repackaging tool or installed with a utility that is "state aware". A simple tool that can be used to accomplish this is Auto IT. With this free tool, installations can be scripted to wait for an active dialog box to present itself prior to continuing using a WinWait command. For example:

```
WinWait, Intervideo WinDVD 4 - InstallShield Wizard, Finish
WinActivate, Intervideo WinDVD 4 - InstallShield Wizard, Finish
Send, !N
```

In this example, Auto IT waits for the Intervideo dialog box to present itself, ensures that the focus is the Intervideo dialog box, and sends the key stroke for the next dialog box. You must ensure that applications are installed from a network source or from the local machine.

Lessons learned

The preferred method of installation is from the source directory. There are times when using a "state aware" tool such as Auto IT to install from a network source will result in an improper installation. In these cases, assuming that you want to use the same tool, perform the installation locally on the destination desktop. On the options tab in Builder, select the option to install the source files on the desktop. Ensure that the application is configured in the script to install from the source directory⁷ rather than a hard-coded file location.⁸ This method leaves the installation files on the destination workstation. If you do not want the files accessible to the end user, you must create a script that will remove the install directories and files located in the last install slot.

Drivers

If the machine type(s) and model(s) are known, download the latest OEM device Drivers from the manufacturer's Website prior to arriving at the IITC. If not, you might be able to download these from the OEM manufactures site at the IITC. Copy the Drivers to a folder created in the project sub-directory.

Important: Device Drivers cannot be deployed in their compressed or compacted state using Builder. You must expand or unzip the drivers you store in the Drivers folder.

Examine the readme.txt file of the Driver to determine if it can be silently installed using command line switches or if a Driver can be installed using an INF file. It might be necessary to contact the Driver's developer directly for the correct silent installation commands. It is the practitioners' responsibility to determine which method to employ, and to verify the proper operation following installation.

⁶ Access ThinkPad, IBM Access Support, the ThinkPad Configuration utility, etc.

⁷ For example, "Run, %A_SCRIPTDIR%\SETUP.exe"

⁸ For example, "x:\install\setup.exe"

Note: When browsing the driver's source directories, operating system, or application location, the connection can take minutes while "walking" the directory tree. Delete the FQN from the browse window and use the drive letter mapped to the project directory to go there directly.

The IITC uses only the Network, Modem, Video, Audio, and Other directories to deploy Drivers during SysPrep. You must use one of these directories to deploy your Drivers. If you have multiple Drivers that can be installed to a certain device type and you are unsure if there might be a conflict in file types, versions, or DLLs, split the Drivers between the target directory (e.g., Video and Other). Also, if you intend to leave the files on the device after the installation is complete and if the standard directories are deleted after the initial driver installation, you can make a sub-directory the IBMTOOLS\Drivers directory in order to create an installation repository.

Xpoint Rapid Restore PC

Briefly, Rapid Restore PC 3.2 is a backup and restore utility manufactured by Xpoint Technologies. RRPC can perform full, incremental, manual, and automated backups. Manual backups and restores can be initiated from the desktop via a GUI. Restores can also be accomplished by depressing the F11 key when booting.

The IBM mobile computer uses a variation of this utility called Rapid Restore Ultra 3.01 service pack 1, which has been fully tested and certified as ready for deployment by the IITC. The Rapid Restore Ultra version of the Xpoint utility was found to be incompatible for deployment on the OEM device selected by the customer. The IITC was understandably reluctant to attempt re-engineering a Rapid Restore solution while a proven "off the shelf" solution already existed. Consequently, the latest iteration of the utility was used on the OEM desktop, while the Rapid Restore Ultra iteration was used on the IBM PCs with the customer's approval. The functionality of both utilities is very similar.⁹

Xpoint provided an RRPC license key to ITS that was used to qualify RRPC 3.2 on the corporate image. RRPC was silently installed with a service partition configured to 50% of the 40 GB hard drives on the OEM desktops. The following tests were run during this process:

- ▶ RRPC 3.2 Install tests
- ▶ RRPC 3.2 Backup tests
- ▶ RRPC 3.2 Restore tests ¹⁰

Rapid Restore PC is configured to be the last module installed in the build process. The utility is installed, the device reboots, and an initial full backup is made of the pristine environment. In this scenario, the customer also requested that the utility be configured to perform an incremental backup every Thursday to ensure that any restore would never be more than seven days old. The schedule option is scripted in the install module.

⁹ There is one additional toolbar menu selection available on the GUI for Rapid Restore PC 3.2, and the titles are visible on the splash screens (i.e., displaying Rapid Restore Ultra as opposed to Rapid Restore PC).

¹⁰ Restoring the base, incremental and most recent backups

Testing

Deployment testing is the single most time-consuming activity of the assignment. Prior to the practitioner's arrival, the customer should ship to the IITC at least two of each model to which the image will be deployed. Three units are preferable, since this will enable the practitioner to test multiple modules/configurations simultaneously. Each installation module must be tested on each device model that the customer will deploy.

- ▶ Test the individual modules and rewrite as necessary in order to achieve a successful installation
- ▶ Test the module as a regular deployment from the network
- ▶ Test the entire installation as an install CD set

After successfully testing all modules for the OEM deployment, these modules can then be updated to "gold" status. Keep in mind that once the module is set to "gold," it can no longer be modified in any way. If the module is found to be defective after being upgraded to "gold," the module must be recreated from scratch, retested, and recertified as viable for deployment.

Deployment

There are three alternative methods to deployment of the solution:

1. Deploy the solution using the network or by sending CDs created using Builder to the user for self-installation.
2. Deploy the solution at the desk side using "x" number of CDs or a DVD created using the Builder tool. Expect the installation to take 45 minutes to one hour and fifteen minutes per desktop.
3. Using a deployment utility such as Symantec's Ghost or IBM Business Partner PowerQuest's DeployCenter 5.5, place the solution on the desktop/mobile computer service partition serially, or multicast the solution and ship the unit to the user. Power-on the unit at the desktop and let the user/installer select the installation options.

This client opted for the third approach, which was executed at the Customer Service Center in Rochester, MN. The team at the CSC was professional and easy to work with. PowerQuest's DeployCenter was selected as the deployment tool of choice. Issues were encountered early using the DeployCenter application to create and deploy images to the units. The deployment consistently failed approximately 15 minutes into the installation. After several hours of attempting to resolve the issue and contacting PowerQuest support, a Ghost solution was used to meet SLA constraints. PowerQuest support continued to work toward a resolution. The Ghost solution, known to work and gathered at the IITC, required several steps in order to work with the Builder solution. The steps included:

- 1. To convert an IITC recovery solution to Ghost and place it on a server:**
 - a. Restore the IITC solution from provided recovery CDs. When complete, do *not* boot to the solution. Instead, use a network boot disk and boot to that disk.
 - b. Determine where gdisk is located in your environment and change to that directory.
 - c. Run "gdisk 1 /status" to confirm that only one partition is present.
 - d. Run "gdisk 1 /cre /pri /for /q /sz:500" to create a second partition.
 - e. Run "gdisk 1 /cre /pri /for /q /sz:500" to create a third partition.
 - f. Run "gdisk 1 /cre /pri /for /q" to create the fourth partition

Note: No size was specified this last time.

- g. Run “gdisk 1 /status” to confirm that there are now four (4) partitions present. The fourth partition will be identified as “IBM Service”. If the fourth partition is not labeled “IBM Service,” contact the US ImageUltra team for assistance.
- h. If required by your environment, change to the directory where ghost.exe is located. Otherwise, ensure that your path includes the directory where Ghost is located.
- i. Create scriptup.txt file from the template below.¹¹
- j. Create a ghost image using the following command:

```
ghost.exe @scriptup.txt
```

where scriptup.txt represents the path and file name created in step h above. This will automate the creation of the ghost image.

2. To load a converted ghost image from the server onto the system:

- a. Create a scriptdown.txt file from the template provided below.¹²
- b. If required by your environment, change to the directory containing Ghost. Otherwise, ensure that your path includes the directory where Ghost is located.
- c. Restore the ghost image using the following command:

```
ghost.exe @scriptdown.txt
```

where scriptdown.txt represents the path and the name of the file edited in step 1 above. This will automate the restore of the ghost image.

- d. Change to the directory where gdisk is located in your environment.
- e. Run “gdisk 1 /del /pri:3”
- f. Run “gdisk 1 /del /pri:2”
- g. Run “gdisk 1 /del /pri:1”
- h. Run “gdisk 1 /status” to confirm that only one partition remains and is labeled “IBM Service”. If it is not so labeled, contact the US ImageUltra team for assistance.
- i. Run partinfo.exe and capture the resulting information to a file. Send this file to the US IITC at trinaa@us.ibm.com for confirmation that our test solution worked correctly. The command is:

```
partinfo > info.txt
```

- j. The solution is now complete.

¹¹ See notes on how to edit the template

¹² See notes on how to edit the template.

Scriptup.txt (edit the red text as appropriate; delete the blue text):

```
-ib
-clone,MODE=dump,SRC=1,DST=i:\11206\ghost\cdtest2.gho,SZE4=F
SRC=1 (hard drive in system)
DST=server destination where file is to be created; make sure to note name for use in
subsequent script
-fis
-split=600
-auto
-batch
-sure
-z6
```

Scriptdown.txt (edit the red text as appropriate; delete the blue text):

```
-clone,MODE=load,SRC=i:\11206\ghost\cdtest2.gho,DST=1,SZE4=F
SRC=server destination of file to be restored; was the DST entry in previous script
DST= hard drive to be imaged
-ib
-fis
-auto
-batch
-sure
```

Performing this procedure is somewhat tedious but workable. A PowerQuest solution was arrived at and the remaining units deployed using DeployCenter. The DeployCenter process is as follows:

1. Create the image command line:

```
pqimgctr /mbi=1 /cmp=high /ovi=1 /cmd=a:\iscript.txt /img=I:\<share>\<file_name>.pqi
```

Where a:\iscript.txt is a location and file (see below) describing how the image is to be created and I:\<share>\<file_name>.pqi is the location of a network share point, and the name of image.

```
SELECT DRIVE 1
SELECT PARTITION ALL
STORE
```

Note: This procedure is run once.

2. Restore the image to the desktop/mobile computer:

```
pqimgctr /mbr=1 /cmp=high /ovi=1 /cmd=a:\rscript.txt /img=I:\<share>\<file_name>.pqi
```

Where a:\rscript.txt is a location and file (see below) describing how the image is restored to the desktop/mobile computer, and I:\<share>\<file_name>.pqi is the location of a network share point and file name of the image to be restored.

```
SELECT DRIVE 1
DELETE ALL
SELECT FREESPACE LARGEST
CREATE /FS=FAT32 /SIZE=6666.6
SELECT FREESPACE NEXT
CREATE /FS=FAT32 /SIZE=6666.6
SELECT FREESPACE NEXT
CREATE /FS=FAT32 /SIZE=6666.6
SELECT FREESPACE NEXT
```

```
SELECT IMAGE ALL  
RESTORE  
SELECT PARTITION 3  
DELETE  
SELECT PARTITION 2  
DELETE  
SELECT PARTITION 1  
DELETE
```

Using the command line and the restore script, no other intervention is required and the image is deployed to multiple devices simultaneously. Then the device is automatically powered off and ready to ship to the customer for installation.

The team that wrote this Redpaper

This Redpaper was produced by IBM Global Services—Integrated Technology Services in conjunction with the International Technical Support Organization, Raleigh Center.

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